MFC, energy saving?

Maria Manzano Ramírez, Microbiology grade
UAB Universitat Autònoma de Barcelona

Goals:

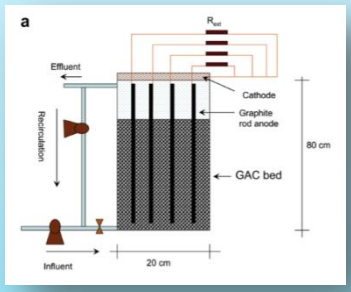
- Check out if a microbial fuel cell (MFC) can save energy in a 7200 people village (Gelida)
- Check out if a MFC can save energy in a 5 people house
- If all of this is possible, how can they should be built

Data used

	Wastewater production	Energy consumption
Gelida	1440 m^3/day 525600m^3/year	113KWH/day /person 813600KWH/year
5 people house	0,2 m^3/day 73 m^3/year	9922 KWH/year

Multi anode –cathode MFC:

- Residence time = 24h
- Multiple anodes were installed in the cylinder chamber, comprising multiple graphite rods mounted on a plastic frame to collect electrons in the granular activated carbon bed



Calculations

Gelida

$$\frac{1440000L}{day} * \frac{0{,}281\ g}{L} * \frac{14{,}7KJ}{g^{-}COD} * \frac{1kWh}{3600kJ} = 1652{,}28\frac{KWH}{dia} * 365\frac{days}{year} = \mathbf{603082{,}2\frac{KWh}{year}}$$

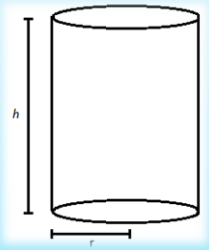
5-people house

$$\frac{200L}{day} * \frac{0{,}281\ g}{L} * \frac{24{,}45KJ}{g^{-}COD} * \frac{1kWh}{3600kJ} = 0{,}2295\frac{KWH}{dia} * 365\frac{days}{year} = \mathbf{83{,}76\frac{KWH}{any}}$$

Money saved in a year:

	€ saved
Gelida	86.482€
5-people house	12€

Architecture:



$\pi * r^2 * h = \ total\ volume$

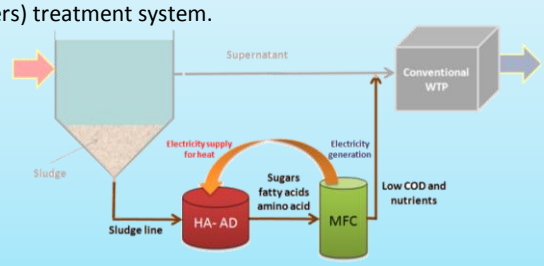
h has to be 8 times larger than 2*r* *(Jiang et al[6])*

Dimensions calculated

Gelida	**Diameter = 7,7 m** **Height = 30,8112 m**
5-people house	Diameter = 0,4 m Height = 1,6 m

WWTP distribution in our case

MFC would replace the AS (Activated sludge) or TF (Trickling filters) treatment system.



Conclusions:

- The installation of an MFC in a 5-peolpe house is not economically viable.
- Gelida WWTP can have an MFC because no much space is needed and benefits are high.
- If Gelida installed an MFC, architectural changes would be required to adapt to the selected tank and materials.
- More research is needed to build profitable MFCs for 5-people houses.

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